

The Male Genitalia of Some *Criorhina* Meigen Species from North America (Diptera: Syrphidae)¹

J. L. NAYAR

DEPARTMENT OF ENTOMOLOGY AND PARASITOLOGY
UNIVERSITY OF CALIFORNIA, BERKELEY, CALIF. 94720

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Abstract: The male genitalia of eight species of *Criorhina* Meigen (*C. caudata* Curran, *C. kincaidi* Coquillett, *C. luna* Lovett, *C. lupina* (Williston), *C. nigripes* (Williston), *C. nigriventris* Walton, *C. tricolor* Coquillett and *C. verbosa* (Walker)) are described. A key based on terminalia is provided for the species studied.

This study deals with male terminalia of eight species of the genus *Criorhina* Meigen from North America.

Metcalf's (1921) terminology and method of preparation used for terminalia study has been followed in the present work. The diagrams were drawn with the aid of camera lucida under a stereomicroscope.

I wish to thank Prof. Ray F. Smith, Chairman of the Department of Entomology and Parasitology, University of California, Berkeley, for providing me with facilities for work. I am indebted to Dr. F. R. Cole, Dipterologist, for generous advice, assistance, helpful suggestions and checking of the manuscript, and to Dr. John A. Chemsak, Division of Entomology, Berkeley, for constructive and helpful reading of the paper. The author expresses his sincere appreciation and thanks to Dr. Karl V. Krombein, Chairman, Department of Entomology, Smithsonian Institution, for the generous loan of specimens.

DESCRIPTION OF MALE TERMINALIA

Criorhina lupina (Williston) (Figs. 1, 2 and 3)

Epandrium trough-shaped, about as wide as long with lower corners produced and acute. Styles longer than depth of epandrium, almost similar to those of *C. lupina*. Cerci small, pubescent on rest of surface. Cerci narrow, kidney-shaped, pilose.

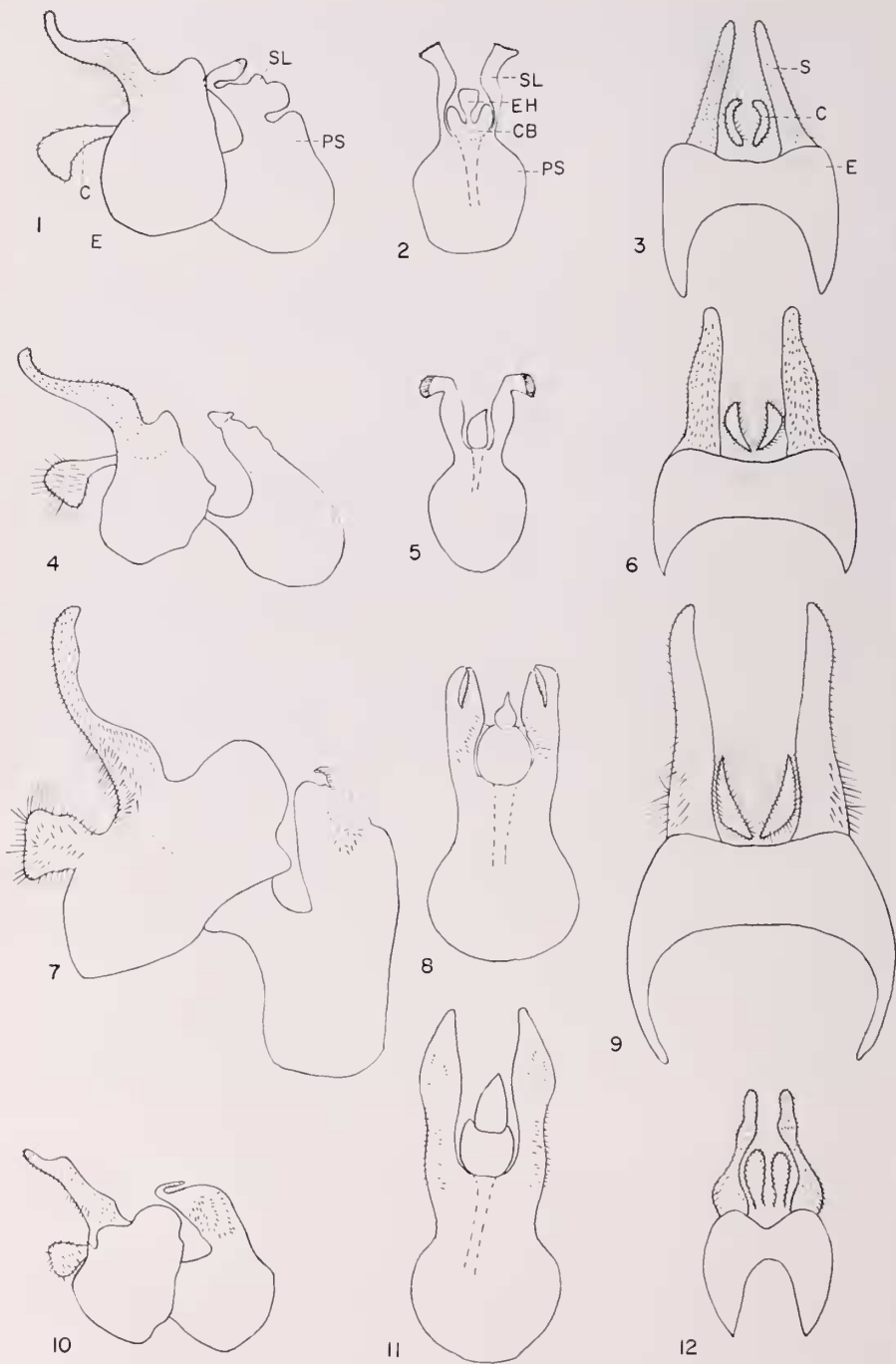
Penis sheath longer than depth of epandrium. Superior lobes long, narrow basally and broad apically, apical tip black, chitinised, brush-bordered; terminal half flexed over basal region. Chitinous box V-shaped. Ejaculatory hood small, narrow at basal one-fourth and broad apically.

Criorhina tricolor Coquillett (Figs. 4, 5 and 6)

Epandrium trough-shaped, broader than long with lower corners produced and acute. Styles longer than depth of epandrium, almost similar to those of *C. lupina*. Cerci small, kidney-shaped; long pile along lateral borders.

Penis sheath longer than depth of epandrium, narrowed medially. Superior lobes long, broad medially and narrow both basally and apically; apex dark, with fine hairs. Ejaculatory hood broad basally and conical apically.

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Criorhina nigriventris Walton (Figs. 7, 8 and 9)

Epandrium trough-shaped, broader than long with lower corners greatly produced and acute. Styles as long as depth of epandrium, broad basally and narrowing apically; long, dense pile along outer border from base to about one-third its length and clothed with medium sized hairs over rest of surface. Cerci somewhat kidney-shaped; pilose.

Penis sheath longer than depth of epandrium. Superior lobes long, narrow basally, broad subapically, apex narrow, conical; a row of setae apically and numerous setae midventrally. Chitinous box oval. Ejaculatory hood flask-shaped.

Criorhina verbosa Walker (Figs. 10, 11 and 12)

Epandrium trough-shaped, about as long as wide, median narrow groove mid-posteriorly with lower corners produced and acute. Styles as long as depth of epandrium broad both basally and sub-apically and narrowing terminally; long pile along outer border at basal half and medium sized over remaining surface. Cerci oval, narrow basally, about half as long as styles; clothed with long bristles.

Penis sheath longer than depth of epandrium. Superior lobes long, similar to *nigripes*; numerous small setae at basal, cylindrical half and circlet of small spines sub-apically. Chitinous box D-shaped. Ejaculatory hood long, dome-shaped.

Criorhina nigripes (Williston) (Figs. 13, 14 and 15)

Epandrium trough-shaped, about as wide as long with lower corners produced and acute. Styles longer than half the depth of epandrium, appearing bi-fid in lateral view; long pile along outer and inner borders. Cerci narrow basally, broad medially and conical apically; pilose.

Penis sheath longer than depth of epandrium. Superior lobes long, basal half narrow, cylindrical, broad medially and narrow apically, terminal part lying curved over sub-apical region; small bristles along outer borders of broadened region and curved apex. Chitinous box horseshoe-shaped. Ejaculatory hood small, conical.

Criorhina luna Lovett (Figs. 16, 17 and 18)

Epandrium trough-shaped, depth about three-fourths width with lower corners produced and acute. Styles two-thirds depth of epandrium, broad, gradually narrowing apically; pile long medially along outer border and short, dense along inner margin. Cerci kidney-shaped, narrow with long hairs.

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FIG. 1. Male genitalia of *Criorhina lupina* (Williston) (lateral view).

FIG. 2. Penis sheath of *Criorhina lupina* (Williston) (ventral view).

FIG. 3. Epandrium of *Criorhina lupina* (Williston) (dorsal view).

FIG. 4. Male genitalia of *Criorhina tricolor* Coquillett (lateral view).

FIG. 5. Penis sheath of *Criorhina tricolor* Coquillett (ventral view).

FIG. 6. Epandrium of *Criorhina tricolor* Coquillett (dorsal view).

FIG. 7. Male genitalia of *Criorhina nigriventris* Walton (lateral view).

FIG. 8. Penis sheath of *Criorhina nigriventris* Walton (ventral view).

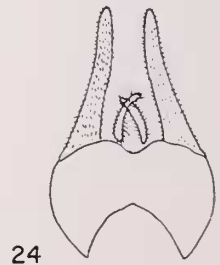
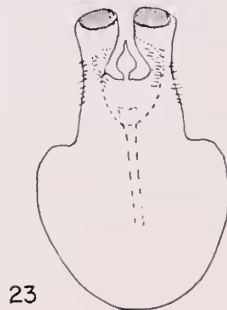
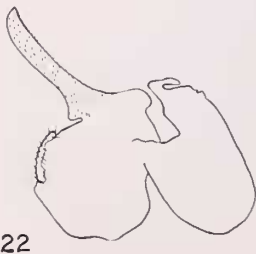
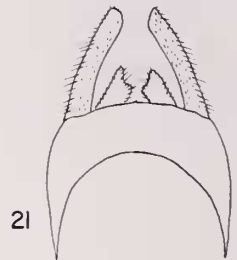
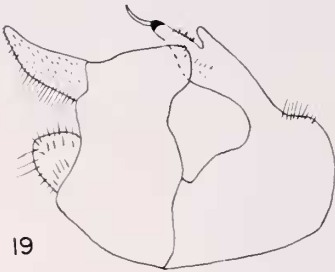
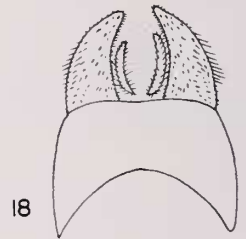
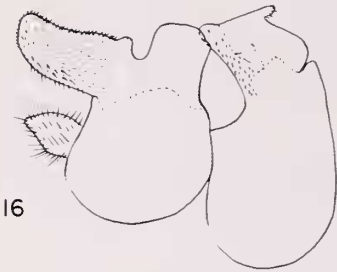
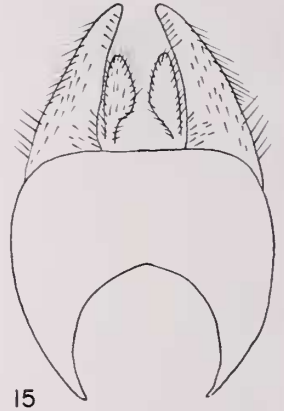
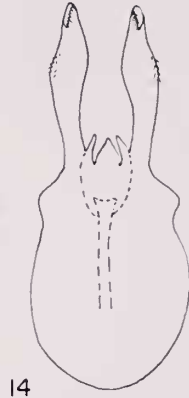
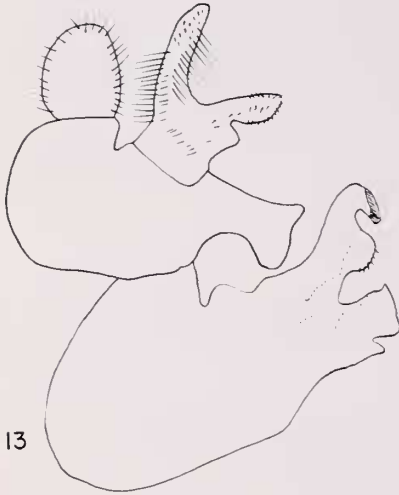
FIG. 9. Epandrium of *Criorhina nigriventris* Walton (dorsal view).

FIG. 10. Male genitalia of *Criorhina verbosa* Walker (lateral view).

FIG. 11. Penis sheath of *Criorhina verbosa* Walker (ventral view).

FIG. 12. Epandrium of *Criorhina verbosa* Walker (dorsal view).

Abbreviations: C, cerci; CB, chitinous box; E, epandrium; EH, ejaculatory hood; PS, penis sheath; S, stylus; SL, superior lobes.



Penis sheath longer than depth of epandrium. Superior lobes long, about one-third of apical part lying curved over middle part; a circlet of small setae at basal area, some terminally and along outer border at apical part. Ejaculatory hood small, quadrangular.

Criorhina kincaidi Coquillett (Figs. 19, 20 and 21)

Epandrium trough-shaped, depth about three-fourths width with lower corners produced and acute. Styles narrow, tubular, shorter than depth of epandrium; long fine hairs along outer border on about basal three-fourths and fine pubescence over remaining surface. Cerci short, broad with long pile.

Penis sheath longer than depth of epandrium; a patch of long bristles present laterally near base. Superior lobes long, narrow, tubular with a terminal process, black chitinized below process; clothed with medium sized bristles laterally at basal half. Ejaculatory hood short, broad, pointed apically.

Criorhina caudata Curran (Figs. 22, 23 and 24)

Epandrium trough-shaped, about one and one half times wider than long with lower corners produced and acute. Styles narrow, tubular, longer than depth of epandrium; minutely pubescent. Cerci kidney-shaped, narrow, covered with fine long hairs.

Penis sheath longer than depth of epandrium; sharp constriction between bases of superior lobes and basal rim of penis sheath. Superior lobes long; narrow, black, brush-bordered apical part flexed over broad sub-apical region; medium sized hairs present at about middle part. Chitinous box triangular. Ejaculatory hood broad medially, narrow basally and pointed apically.

DISCUSSION OF MALE GENITALIA IN *Criorhina* MEIGEN AND GROUPINGS

Features of the male genitalia which are fairly constant within the genus are the penis sheath longer than depth of epandrium, a constriction between bases of superior lobes and basal rim of penis sheath and long superior lobes. The species studied can be divided readily into three groups; the Lupina group, the Verbosa group, and the Kincaidi group.

Lupina group

The group with *C. lupina*, *C. tricolor* and *C. nigriventris* is characterized by the shape of the styles. *C. lupina* and *C. tricolor* are closely similar in the

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- FIG. 13. Male genitalia of *Criorhina nigripes* (Williston) (lateral view).
 FIG. 14. Penis sheath of *Criorhina nigripes* (Williston) (ventral view).
 FIG. 15. Epandrium of *Criorhina nigripes* (Williston) (dorsal view).
 FIG. 16. Male genitalia of *Criorhina luna* Lovett (lateral view).
 FIG. 17. Penis sheath of *Criorhina luna* Lovett (ventral view).
 FIG. 18. Epandrium of *Criorhina luna* Lovett (dorsal view).
 FIG. 19. Male genitalia of *Criorhina kincaidi* Coquillett (lateral view).
 FIG. 20. Penis sheath of *Criorhina kincaidi* Coquillett (ventral view).
 FIG. 21. Epandrium of *Criorhina kincaidi* Coquillett (dorsal view).
 FIG. 22. Male genitalia of *Criorhina caudata* Curran (lateral view).
 FIG. 23. Penis sheath of *Criorhina caudata* Curran (ventral view).
 FIG. 24. Epandrium of *Criorhina caudata* Curran (dorsal view).

structure of the styles and cerci but distinct in the form of the superior lobes and ejaculatory hood. The species *C. nigriventris* is unique in the group in possessing an oval chitinous box, flask-shaped ejaculatory hood and superior lobes with mid-ventral hairs.

Verbosa group

There is marked variation of various structures in this group. The species *C. verbosa* and *C. nigripes* come closer to one another in the form of the superior lobes, epandrium and penis sheath but differ in the styles, chitinous box and ejaculatory hood. In addition, *C. nigripes* and *C. luna* have similar appearing styles in a dorsal view. *C. luna* is distinct in the group with its circlet of hairs at the basal part of the superior lobes.

Kincaidi group

The two species studied, *C. kincaidi* and *C. caudata*, share only characters of the styles but differ greatly in all other structures of the terminalia.

Key Based on the Male Terminalia for the Species of *Criorhina* Meigen Studied

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| 1. Penis sheath with patch of bristles near base | <i>kincaidi</i> Coq. |
| Penis sheath without bristles at basal part | 2 |
| 2. Epandrium as wide as long; cerci not kidney-shaped | 3 |
| Epandrium wider than long; cerci kidney-shaped | 5 |
| 3. Superior lobes long, broad medially, narrow both basally and apically | 4 |
| Superior lobes long, narrow basally and broad apically | <i>lupina</i> (Will.) |
| 4. Ejaculatory hood dome-shaped | <i>verbosa</i> Walker |
| Ejaculatory hood conical | <i>nigripes</i> (Will.) |
| 5. Styles shorter than depth of epandrium | <i>luna</i> Lovett |
| Styles longer than depth of epandrium | 6 |
| 6. Superior lobes narrow medially with mid-ventral bristles | 7 |
| Superior lobes broad medially, without bristles | <i>tricolor</i> Coq. |
| 7. Chitinous box triangular | <i>caudata</i> Curran |
| Chitinous box oval | <i>nigriventris</i> Walton |

Literature Cited

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